



Spring 2001 Released Test

(Supplemental Information)

End of Course

Biology

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*End
of
Course*

Introducing the Virginia Standards of Learning

Biology

One of the complete test forms from the Spring 2001 Standards of Learning administration is presented in the following pages. The intent of this released test is to provide parents and teachers additional information to accompany the Student Performance Report and/or the Parent Report.

The information accompanying each test question is broken into several components:

Reporting Category: Matches the score report and allows for identification of strengths and weaknesses indicated by student scores.

Standard of Learning: Presents the SOL used in developing the assessment question.

Instruction: Provides information for teachers to use as the SOL is incorporated into instruction.

The answer to each question can be found at the back of the booklet.

Biology

End of Course

Reporting Category: Scientific Investigation

A. Standard of Learning: BIO.1 The student will plan and conduct investigations in which:

a) observations of living things are recorded in the lab and in the field.

Builds On: Work with observation and recording data begins with the first grade SOL and increases in complexity throughout the study of the science SOL.

A

1 A biology class wanted to develop a research project to predict the effects of a new highway on wildflower species found in the Piedmont region of Virginia. The class could *best* conduct such a study by sampling flowers found in the highway construction area —

- A one year before highway construction begins
- B both before and after highway construction is completed
- C immediately after highway construction is finished
- D during the time highway construction is taking place

Instruction: Provide students an opportunity to plan field investigations including the type of data that needs to be calculated.

Biology

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A. Standard of Learning: BIO.1 The student will plan and conduct investigations in which:

b) hypotheses are formulated based on observations.

Builds On: Work with hypotheses begins with the third grade SOL and increases in complexity throughout the study of the science SOL.

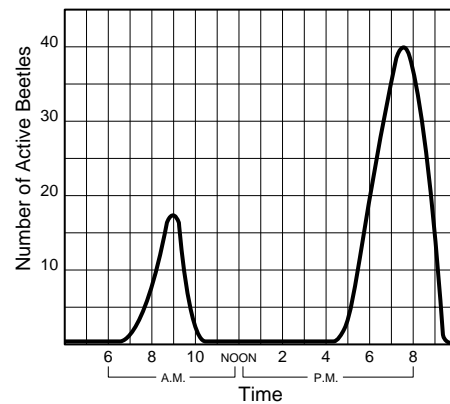
A

2 Two plant species found in a dry region of the western United States exhibit vastly different abilities to survive. Species A has very slow stem growth and few leaves but is very abundant. Species B has rapid stem growth and many leaves but is very rare. Which hypothesis is most likely supported by this information?

- F Leaf shape may give species B an advantage over species A.
- G Flower size and color may give species B an advantage over species A.
- H Reduced root growth may give species A an advantage over species B.
- J Reduced stem growth may give species A an advantage over species B.

3

**Active Periods of
Some Black Beetles**



The hypothesis best supported by this graph is that these beetles are most active when the area is —

- A free from predators
- B coolest with some sunlight
- C wettest from dew
- D richest in oxygen supplies

Instruction: Provide students an opportunity to formulate hypotheses based on graphs, observations, and other information.

Biology

End of Course

A. Standard of Learning: BIO.1 The student will plan and conduct investigations in which:

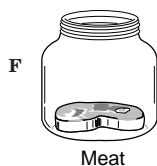
c) variables are defined and investigations are designed to test hypotheses.

Builds On: Work with variables begins in the grade 2 SOL and work with hypotheses begins in grade 3 SOL and continues to increase in complexity throughout the study of the science SOL.

A

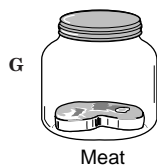
- 4 People long ago believed that maggots came from meat. In the late 1600s, Francesco Redi made the hypothesis that maggots came from flies rather than from meat. Which of these experimental designs could be used to test Redi's hypothesis?

No Covers



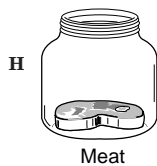
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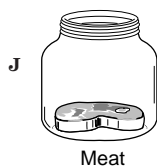


No Cover

Cover



No Covers



Instruction: Provide students an opportunity to analyze an experiment, determine what variables to use to test a hypothesis, and determine how to control the variables.

Biology

End of Course

A. Standard of Learning: BIO.1 The student will plan and conduct investigations in which:

d) graphing and arithmetic calculations are used as tools in data analysis.

Builds On: Work with graphing begins with the first grade SOL and work with analysis of arithmetic calculations begins in the grade 4 SOL and increases in complexity throughout the study of the science SOL.

A

- 5 In 1893, a one-million acre area of the Grand Canyon National Forest Reserve was home to an estimated 3,000 Rocky Mountain mule deer. Cattle, sheep, and horses also roamed the reserve. In 1906, government hunters killed off hundreds of mountain lions, coyotes, and bobcats when the area was set aside as the Grand Canyon National Game Preserve. The number of Rocky Mountain mule deer rose to over 100,000 by 1923. What was the approximate density of the mule deer in 1923?

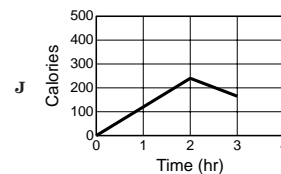
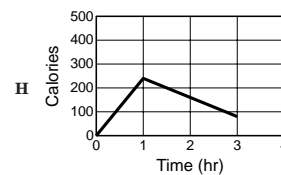
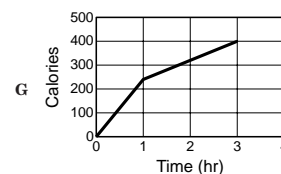
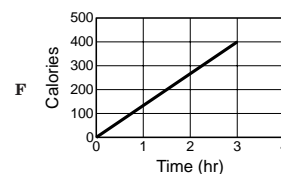
- A 1 for every acre
- B 1 for every 10 acres
- C 1 for every 100 acres
- D 1 for every 1,000 acres

6

**Calorie Use Table
(by 120 lb adult female)**

Activity	Calories Used (per hr)
Walking	80
Gymnastics	170
Jogging	240
Tennis	280
Bicycling	320
Swimming	440

According to the table, which graph below illustrates the calories used for 1 hour of jogging followed by 2 hours of walking?



Instruction: Provide students an opportunity to interpret a graph to determine the relationship between the variables; to utilize basic mathematical calculations in analyzing data; and to draw a conclusion about the relationship of the variables.

Biology

End of Course

A. Standard of Learning: BIO.1 The student will plan and conduct investigations in which:

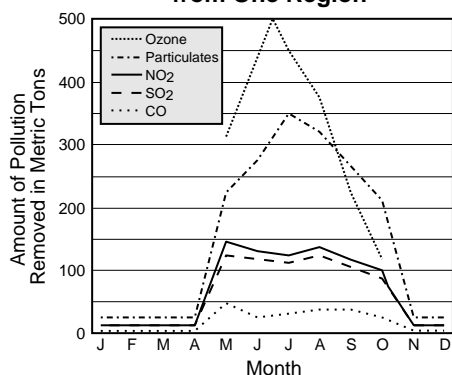
e) conclusions are formed based on recorded quantitative and qualitative data.

Builds On: Work with analysis of data to draw conclusions begins with the third grade SOL and continues to increase in complexity throughout the study of the science SOL.

A

7

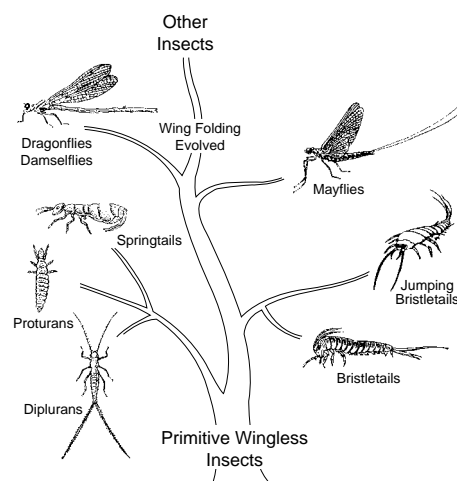
Air Pollution Removed from One Region



The graph shows the amount of pollutants removed by trees. During October, the trees were able to remove the greatest amount of —

- A ozone
- B particulates
- C NO₂
- D SO₂

8



According to this chart, the insects that are most closely related are the —

- F springtails and bristletails
- G dragonflies and proturans
- H springtails and proturans
- J bristletails and mayflies

Instruction: Provide students an opportunity to make conclusions based on quantitative data displayed in graphs and to make deductions on qualitative data such as the family trees of plants and animals.

Biology

End of Course

A. Standard of Learning: BIO.1 The student will plan and conduct investigations in which:

g) validity of data is determined.

Builds On: Work with determining validity of data in experiments begins with the fourth grade SOL and increases in complexity throughout the study of the science SOL.

A

9 Which sentence best states the importance of using control groups?

- A** Control groups allow comparison between subjects receiving a treatment and those receiving no treatment.
- B** Control groups eliminate the need for large sample sizes, reducing the number of measurements needed.
- C** Control groups eliminate the need for statistical tests and simplify calculations.
- D** Control groups provide a method by which statistical variability can be reduced.

Instruction: Provide students opportunities to conduct investigations and determine the importance of control groups in the investigations.

Biology

End of Course

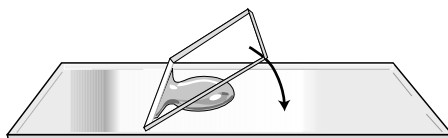
A. Standard of Learning: BIO.1 The student will plan and conduct investigations in which:

i) appropriate technology is used for gathering and analyzing data and communicating results.

Builds On: Work with appropriate scientific tools begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.

A

10



The picture shows a coverslip correctly being lowered onto a slide. This method is used because it —

- F reduces the possibility of air bubbles on the slide
- G prevents the escape of microorganisms found in the water
- H allows microorganisms to move freely in the water
- J prevents the coverslip from moving

Instruction: Provide students an opportunity to prepare wet mount slides.

B. Standard of Learning: BIO.1 The student will plan and conduct investigations in which:

j) research is used based on popular and scientific literature.

Builds On: Work with research in scientific literature begins with the sixth grade SOL and increases in complexity throughout the study of the science SOL.

B

11

Henry's project is on porcupine populations in Virginia. He would like to use the phone book to help him make contacts. His most reliable contacts would probably be found by looking in the phone book under —

- A travel agencies
- B newspapers
- C state agencies
- D civil engineers

Instruction: Provide students an opportunity to conduct research using scientific journals and other popular resources.

Biology

End of Course

Reporting Category: Life at the Molecular and Cellular Level

A. Standard of Learning: BIO.2 The student will investigate and understand the history of biological concepts. Key concepts include:

a) evidence supporting the cell theory.

Builds On: Work with investigating and understanding the history of biological concepts begins with the Life Science SOL in seventh grade and increases in complexity throughout the study of the science SOL.

A

12 Which of these statements best summarizes the cell theory?

- F Cells contain a nucleus and other parts.
- G Cells come in different shapes and sizes.
- H Cells can be seen through a microscope.
- J Cells are the building blocks of living things.

Instruction: Provide students with an opportunity to investigate and understand the cell theory.

Biology

End of Course

A. Standard of Learning: BIO.3 The student will investigate and understand biochemical principles essential for life. Key concepts include:

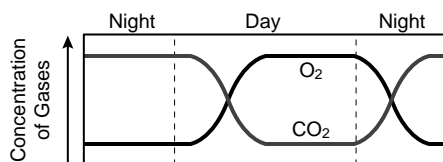
a) water chemistry and its impact on life processes.

Builds On: Work with water chemistry begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.

A

13

O₂ and CO₂ Levels in a Pond



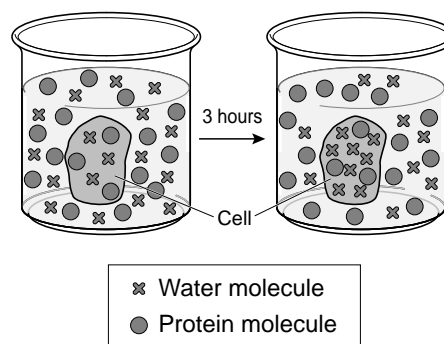
The above graph shows how dissolved O₂ and CO₂ levels changed in a pond over a 24-hour period. What caused the decrease in O₂ concentration during the night?

- A Increased evaporation
- B Decreased photosynthesis
- C Increased respiration
- D Decreased temperatures

14

Before

After



The above diagram shows the process of osmosis. Only the water molecules could enter the cell because water molecules —

- F have more energy than the protein molecules
- G are smaller than the protein molecules
- H are more numerous than the protein molecules
- J contain more hydrogen atoms than the protein molecules

Instruction: Provide students an opportunity to investigate changes in oxygen and carbon dioxide levels during photosynthesis and respiration and investigate the properties of water and its movement in and out of cells through the cell membrane.

Biology

End of Course

A. Standard of Learning: BIO.3 The student will investigate and understand biochemical principles essential for life. Key concepts include:

b) the structure and function of macromolecules.

Builds On: Work with the structure and function of macromolecules begins with the Life Science SOL and increases in complexity throughout the study of the science SOL.

A 15 DNA Molecule Segment

Phosphate group

5-carbon sugar

Pairing of Nitrogen Bases
Adenine pairs with thymine.
Cytosine pairs with guanine.

Which of these segments could be used to correctly complete the DNA molecule in the diagram above?

A

C

B

D

Instruction: Provide students an opportunity to investigate and understand the structure of the DNA molecule.

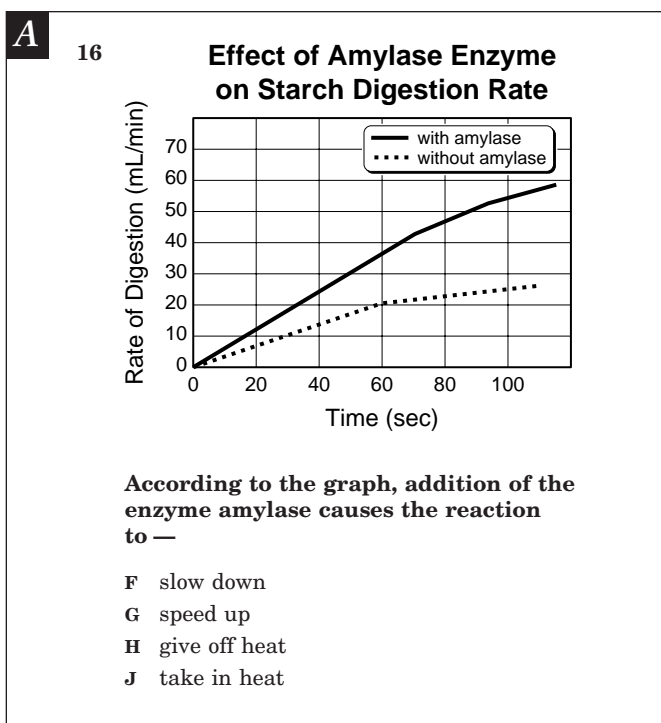
Biology

End of Course

A. Standard of Learning: BIO.3 The student will investigate and understand biochemical principles essential for life. Key concepts include:

c) the nature of enzymes.

Builds On: Work with biochemical processes for life begins with the Life Science SOL and increases in complexity throughout the study of the science SOL.



Instruction: Provide students an opportunity to investigate the role of enzymes and to interpret data in a graph showing enzyme activity.

Biology

End of Course

A. Standard of Learning: BIO.3 The student will investigate and understand biochemical principles essential for life. Key concepts include:

d) the significance of and relationship between photosynthesis and respiration.

Builds On: Work with photosynthesis begins with the fourth grade SOL and increases in complexity throughout the study of the science SOL.

A 17 **Comparison of Photosynthesis and Respiration**

	Photosynthesis	Respiration
Raw Materials	water and CO ₂	glucose and oxygen
Products	glucose and oxygen	water and CO ₂
Purpose	store energy	release energy

The processes of photosynthesis and respiration can be thought of as a cycle because —

- A** one is used only by plants and the other is used only by animals
- B** both give off oxygen to be used by animals
- C** the products of one are used as the raw materials of the other
- D** they both have the same purpose

Instruction: Provide students an opportunity to investigate the relationship between the reactants and products of cellular respiration and photosynthesis.

Biology

End of Course

A. Standard of Learning: BIO.4 The student will investigate and understand relationships between cell structure and function. Key concepts include:

b) exploring the diversity and variation of eukaryotes.

Builds On: Work with cell structure and function begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.

A

18

Cell Organelles and Functions

Kingdom	Metabolism	Control	Covering	Food Production
Fungi	mitochondria	nucleus	cell wall	none
Animalia	mitochondria	nucleus	cell membrane	none
Plantae	mitochondria	nucleus	cell wall	chloroplasts
Protista	mitochondria	nucleus	cell membrane	some with chloroplasts
Monera	ribosomes	DNA strand	cell wall	none

Which of these statements is supported by the data shown in the table?

- F** Most kingdoms are made up of prokaryotic cells.
- G** All cells have nuclei for control of cell functions.
- H** Eukaryotic cells vary in covering and in food production.
- J** Each of the kingdoms has different organelles for metabolism.

Instruction: Provide students an opportunity to investigate eukaryotic cell organelles and their characteristics, and interpret information found in a data table.

Biology

End of Course

A. Standard of Learning: BIO.4 The student will investigate and understand relationships between cell structure and function. Key concepts include:

c) building analogies between the activities of a single cell and a whole organism.

Builds On: Work with cells begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.

A

19 Which of these functions most like the “brain” of a cell?

- A The nucleus
- B The Golgi apparatus
- C The mitochondrion
- D The smooth endoplasmic reticulum

20 In the human body, the circulatory system transports and delivers substances. Within the cell, which organelle performs a similar function?

- F Nucleus
- G Golgi apparatus
- H Mitochondrion
- J Endoplasmic reticulum

Instruction: Provide students an opportunity to investigate similarities between activities of cell structures and human body activities.

Biology

End of Course

A. Standard of Learning: BIO.6 The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include:

b) sex cell formation.

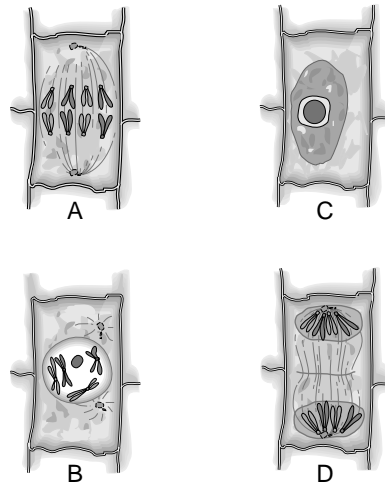
Builds On: Work with cells and inheritance begins with the Life Science SOL in seventh grade and increases in complexity throughout the study of the science SOL.

A

21 The reduction of the chromosome number during meiosis is most important for —

- A preventing the nucleus from becoming larger with each cell division
- B maintaining the chromosome number during sexual reproduction
- C keeping the amount of DNA in the cell at a minimum level
- D allowing the growth of the cell without increasing the DNA content

22



What is the correct sequence for plant cell mitosis?

- F A, B, D, C
- G C, B, A, D
- H B, A, D, C
- J D, C, B, A

Instruction: Provide students an opportunity to investigate meiosis and mitosis in terms of the process and the final results.

Biology

End of Course

A. Standard of Learning: BIO.6 The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include:

e) effects of genetic recombination and mutation.

Builds On: Work with cells and inheritance begins with the Life Science SOL in seventh grade and increases in complexity throughout the study of the science SOL.

A 23

G-G-T-A-C-A-G-A-T-C-T-T-A-A-G-C-A-A

In order to form recombinant DNA, scientists have found a way to cut a DNA segment using an enzyme named *EcoRI*. This enzyme cuts DNA wherever the sequence C-T-T-A-A-G occurs between the A and the G base. Which of these would result if *EcoRI* were used on the DNA in the diagram above?

A G-G-T-A-C-A-G A-T-C-T-T-A-A G-C-A-A

B G-G-T-A-C-A G-A-T-C-T-T-A-A-G-C-A-A

C G-G-T-A-C-A-G-A-T-C-T-T-A-A G-C-A-A

D G-G-T-A-C-A-G A-T-C-T-T-A-A-G-C-A-A

Instruction: Provide students an opportunity to investigate and understand the sequence of bases in a DNA segment and how DNA strands can be cut into segments.

Biology

End of Course

A. Standard of Learning: BIO.6 The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include:

f) events involved in the construction of proteins.

Builds On: Work with cells and protein synthesis begins with the Biology SOL and increases in complexity throughout the study of the science SOL.

A

24

Second Base

		U	C	A	G	
First Base	U	Phe	Ser	Tyr	Cys	U
		Phe	Ser	Tyr	Cys	C
		Leu	Ser	stop	stop	A
		Leu	Ser	stop	Trp	G
	C	Leu	Pro	His	Arg	U
		Leu	Pro	His	Arg	C
		Leu	Pro	Gin	Arg	A
		Leu	Pro	Gin	Arg	G
	A	Ile	Thr	Asn	Ser	U
		Ile	Thr	Asn	Ser	C
		Ile	Thr	Lys	Arg	A
		Met	Thr	Lys	Arg	G
	G	Val	Ala	Asp	Gly	U
		Val	Ala	Asp	Gly	C
		Val	Ala	Glu	Gly	A
		Val	Ala	Glu	Gly	G
	Third Base					

Genetic Code for Amino Acids

According to this table, a codon AGC is the code for which amino acid?

F Cysteine (Cys)

G Leucine (Leu)

H Serine (Ser)

J Tyrosine (Tyr)

Instruction: Provide students an opportunity to understand how to use a codon to identify an amino acid in a table.

Biology

End of Course

A. Standard of Learning: BIO.6 The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include:

g) exploration of the impact of DNA technologies.

Builds On: Work with DNA technologies begins with the Life Science SOL in seventh grade and increases in complexity throughout the study of the science SOL.

A

25 Which of the following is an example of a genetically engineered organism?

- A** A plant that received external DNA to produce natural insecticides
- B** A new plant variety created by cross-pollination
- C** Seedless fruits resulting from grafting of one plant onto another
- D** A plant that naturally possesses medicinal properties

Instruction: Provide students an opportunity to investigate the use of genetic engineering techniques and genetic engineered organisms.

Biology

End of Course

Reporting Category: Life at the Systems and Organisms Level

A. Standard of Learning: BIO.5 The student will investigate and understand life functions of monerans, protists, fungi, plants, and animals, including humans. Key concepts include:

a) how their structures are alike and different.

Builds On: Work with kingdoms begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.

A

26 The body of which of these organisms has the *least* specialized organization?

- F Jellyfish
- G Sea urchin
- H Starfish
- J Sponge

27

The cell has a cell wall and many organelles, including mitochondria, a nucleus, a vacuole, and several chloroplasts.

A student wrote this description of a cell after looking at it under a microscope. Which type of cell was the student most likely describing?

- A Animal cell
- B Fungus cell
- C Bacterium cell
- D Plant cell

Instruction: Provide students an opportunity to investigate the cellular organization level of different organisms and recognize cells of different kingdoms by their characteristics.

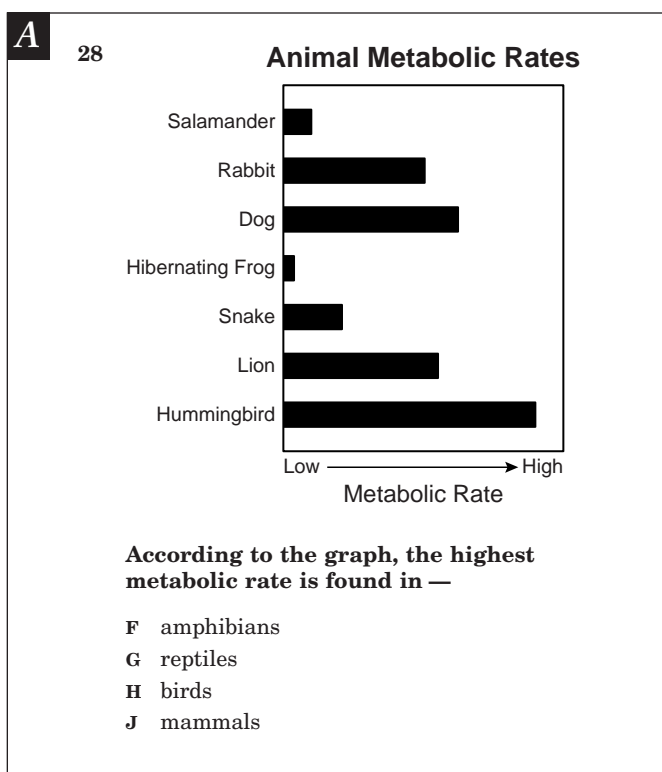
Biology

End of Course

A. Standard of Learning: BIO.5 The student will investigate and understand life functions of monerans, protists, fungi, plants, and animals, including humans. Key concepts include:

b) comparison of their metabolic activities.

Builds On: Work with kingdoms begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.



Instruction: Provide students an opportunity to interpret graphs and make comparisons of the metabolic rates in some animals.

Biology

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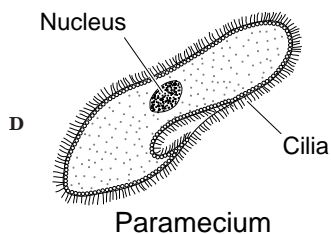
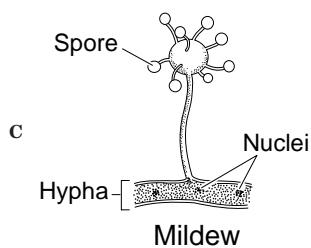
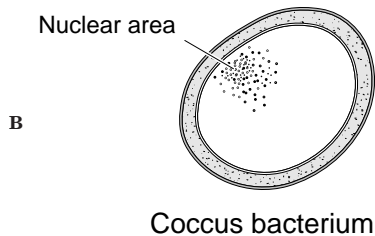
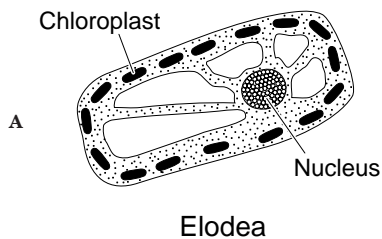
A. Standard of Learning: BIO.5 The student will investigate and understand life functions of monerans, protists, fungi, plants, and animals, including humans. Key concepts include:

c) analyses of their responses to the environment.

Builds On: Work with kingdoms begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.

A

29 Which of these is capable of moving quickly in response to its environment?



30 Cleaner fish feed off the algae, fungi, and other microorganisms that are found on larger fish. Other species of fish, which look like the cleaners, are able to approach the larger fish and remove large bites of flesh. If the look-alike populations outnumber the cleaner fish, the —

- F microorganisms on large fish would decrease
- G cleaner populations would increase
- H behavior of large fish would change
- J cleaners and mimics would interbreed

Instruction: Provide students an opportunity to analyze how different organisms respond to their environments and why organisms may change behaviors when other populations change.

Biology

End of Course

A. Standard of Learning: BIO.5 The student will investigate and understand life functions of monerans, protists, fungi, plants, and animals, including humans. Key concepts include:

d) maintenance of homeostasis.

Builds On: Work with kingdoms begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.

A

31 A microorganism which releases water into its environment to regulate its salinity during osmosis is undergoing a process that is similar to a human being who releases moisture on a hot day. This process that helps keep both the microorganism and the human body fluids in balance is known as —

- A homeostasis
- B cell division
- C heredity
- D mutation

Instruction: Provide students an opportunity to investigate and understand homeostasis in microorganisms and in humans.

Biology

End of Course

A. Standard of Learning: BIO.5 The student will investigate and understand life functions of monerans, protists, fungi, plants, and animals, including humans. Key concepts include:

e) human health issues, human anatomy, body systems, and life functions.

Builds On: Work with kingdoms begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.

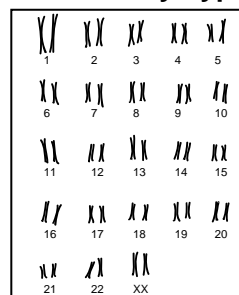
A

32 What is the major function of the valves found in human veins?

- F Preventing movement of blood clots
- G Reducing the back flow of blood
- H Adding oxygen to blood plasma
- J Slowing the red blood cells

33

Human Karyotype



A chart of human chromosome pairs is called a karyotype. What information is revealed in the karyotype above?

- A The sex
- B The age
- C Trisomy
- D Gene dominance

Instruction: Provide students an opportunity to investigate and understand the function of the parts of the human circulatory system and interpret the information presented in a karyotype.

Biology

End of Course

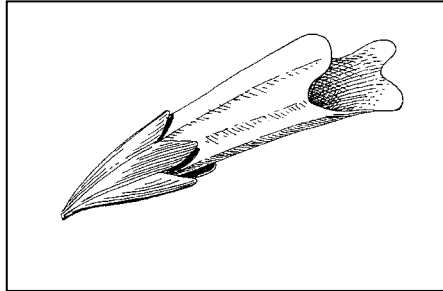
A. Standard of Learning: BIO.5 The student will investigate and understand life functions of monerans, protists, fungi, plants, and animals, including humans. Key concepts include:

g) observation of local organisms when applicable.

Builds On: Work with kingdoms begins with the fifth grade SOL and increases in complexity throughout the study of the science SOL.

A

34



A flower with this shape would use what type of pollinator?

- F Wind
- G Mammal
- H Rain
- J Hummingbird

Instruction: Provide students an opportunity to observe and understand the effect of the shape of a flower on the type of organism that will pollinate it.

Biology

End of Course

A. Standard of Learning: BIO.6 The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include

d) prediction of inheritance of traits based on the laws of heredity.

Builds On: Work with the laws of inheritance begins with the science SOL in fifth grade and increases in complexity throughout the study of the science SOL.

A

35

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T	TT	Tt
t	Tt	tt

In pea plants, tall plants are dominant to short plants. If two heterozygous tall plants are crossed, what percent of the offspring will probably be short?

- A 75%
- B 50%
- C 25%
- D 0%

36

		White-Eyed Male	
		X ^r	Y
Red-Eyed Female	X ^R	X ^R X ^r	X ^R Y
	X ^R	X ^R X ^r	X ^R Y

All offspring have red eyes.

In 1910, Thomas Morgan discovered traits linked to sex chromosomes in the fruit fly. The Punnett square above shows the cross between red-eyed females and white-eyed males. Fruit flies usually have red eyes. If a female and male offspring from the cross shown above are allowed to mate, what would the offspring probably look like?

- F 2 red-eyed females; 2 white-eyed males
- G 2 red-eyed females; 1 red-eyed male, 1 white-eyed male
- H 1 red-eyed female and 1 white-eyed female; 2 red-eyed males
- J 2 white-eyed females; 1 white-eyed male and 1 red-eyed male

Instruction: Provide students an opportunity to investigate heredity of simple dominant and recessive traits; and to investigate and analyze a Punnett square for inherited traits in a variety of monohybrid crosses using both percents and ratios.

Biology

End of Course

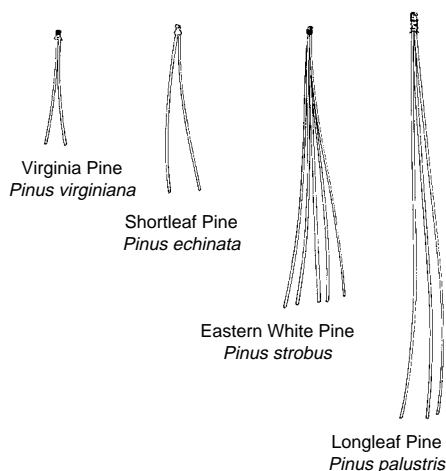
A. Standard of Learning: BIO.7 The student will investigate and understand bases for modern classification systems. Key concepts include:

a) knowing the structural similarities in organisms.

Builds On: Work with classification systems begins with the second grade SOL and increases in complexity throughout the study of the science SOL.

A

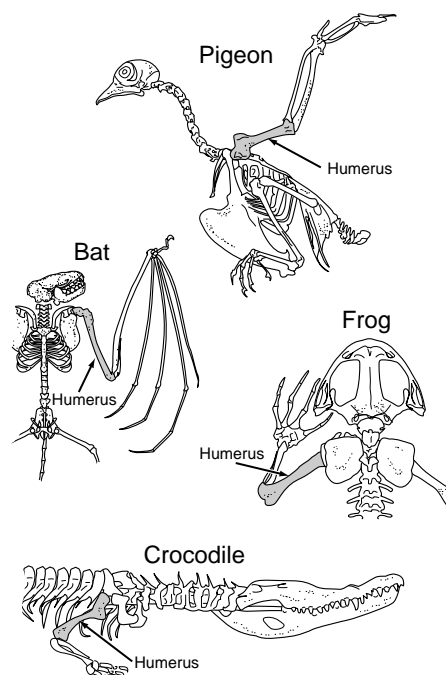
37



A biology student collected pine needles from four different species of trees. She then made diagrams showing the number and actual length of needles in a bundle and the common and scientific name of each species. Use her diagram above to help you answer the following question. These four different pine trees are *not* classified in the same —

- A order
- B species
- C genus
- D phylum

38



All the organisms shown above belong to the Phylum Chordata. The structural similarity in the organisms suggests that —

- F the humerus is attached to the skeleton by immovable joints
- G only animals that walk on 4 legs need the humerus
- H the humerus is the same size in all chordates
- J chordates have common ancestors

Instruction: Provide students an opportunity to understand binomial nomenclature; to investigate the structural similarity of chordates; and to investigate common ancestry among organisms.

Biology

End of Course

A. Standard of Learning: BIO.7 The student will investigate and understand bases for modern classification systems. Key concepts include:

c) comparison of developmental stages in different organisms.

Builds On: Work with the classification systems begins with the second grade SOL and increases in complexity throughout the study of the science SOL.

A

39 The respiration system of frogs differs from mammals because frogs —

- A have lungs at hatching and develop gills for life in the water
- B hatch with gills and develop lungs as they mature
- C have gills throughout their life cycle
- D breathe only through their skin

Instruction: Provide students an opportunity to compare the structural changes during developmental stages of all vertebrate classes.

Reporting Category: Interaction of Life Forms

B. Standard of Learning: BIO.7 The student will investigate and understand bases for modern classification systems. Key concepts include:

b) fossil record interpretation.

Builds On: Work with classification systems begins with the second grade SOL and increases in complexity throughout the study of the science SOL.

B

40 Scientists found the fossilized remains of a canine's jaw and leg. What information must first be obtained before the scientists can place the fossils in the ancestral time line of the dog?

- F The rest of the skeleton
- G The continent where the fossils were found
- H The age of the fossils
- J The population trends for the species

Instruction: Provide students an opportunity to interpret information on fossils and how to use it to place fossils in the ancestral time line.

Biology

End of Course

A. Standard of Learning: BIO.8 The student will investigate and understand how populations change through time. Key concepts include:

b) investigating how variation of traits, reproductive strategies, and environmental pressures impact on the survival of populations.

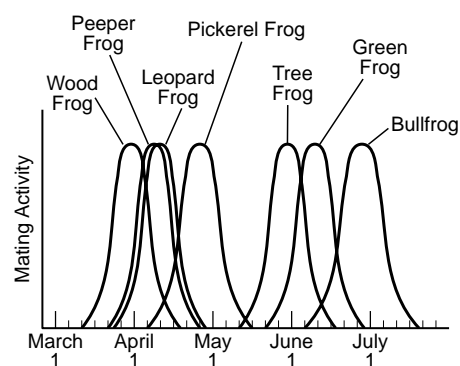
Builds On: Work with changes that occur in populations begins with the second grade SOL and increases in complexity throughout the study of the science SOL.

A

- 41 Tall land plants have requirements different from those of aquatic plants. Which of these must the tall land plants have that aquatic plants do not need?

A Photosynthetic abilities
B Organelles for respiration
C A means of reproduction
D Thick-celled walls

42



Which frog species would be most likely to interbreed?

F Peeper and leopard
G Wood and pickerel
H Bullfrog and green
J Tree and pickerel

Instruction: Provide students an opportunity to investigate how plants have requirements based on where they are found and to understand how to read a chart to determine similar mating activity among animals.

Biology

End of Course

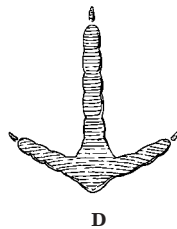
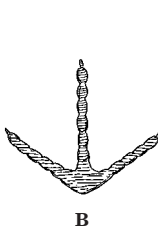
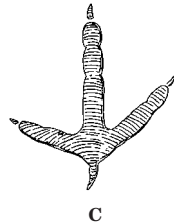
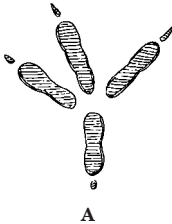
A. Standard of Learning: BIO.8 The student will investigate and understand how populations change through time. Key concepts include:

c) recognizing how adaptations lead to natural selection.

Builds On: Work with changes that occur in populations begins with the second grade SOL and increases in complexity throughout the study of the science SOL.

A

- 43 These feet belong to different birds. Three of the birds spend most of their time on the ground, while one bird rarely walks on the ground. Which foot belongs to the bird that is best adapted for grasping branches?



- 44 The nonpoisonous eastern scarlet snake has colored bands that closely resemble the poisonous coral snake. This selective adaptation provides the eastern scarlet snake with —

F increased breeding opportunities
G a method of avoiding predation
H the ability to attract prey
J increased feeding opportunities

Instruction: Provide students an opportunity to investigate a variety of animal adaptations.

Biology

End of Course

A. Standard of Learning: BIO.8 The student will investigate and understand how populations change through time. Key concepts include:

d) exploring how new species emerge.

Builds On: Work with changes that occur in populations begins with the second grade SOL and increases in complexity throughout the study of the science SOL.

A

45 The 14 different species of finches in the Galapagos Islands originated from a single ancestral species. What is it about these islands that is responsible for the diversity of finch species?

- A The islands are made of volcanic peaks.
- B Each island has different food sources.
- C Each island has a different climate.
- D The islands are clustered near each other.

Instruction: Provide students an opportunity to investigate how different environments can result in adaptations which may result in a new species.

B. Standard of Learning: BIO.9 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include:

a) interactions within and among populations including carrying capacities, limiting factors, and growth curves.

Builds On: Work with ecosystems begins with the third grade SOL and increases in complexity throughout the study of the science SOL.

B

46 A symbiotic relationship in which one organism benefits while one organism is harmed is known as —

- F antagonism
- G commensalism
- H mutualism
- J parasitism

Instruction: Provide students an opportunity to investigate a variety of symbiotic relationships among organisms.

Biology

End of Course

A. Standard of Learning: BIO.9 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include:

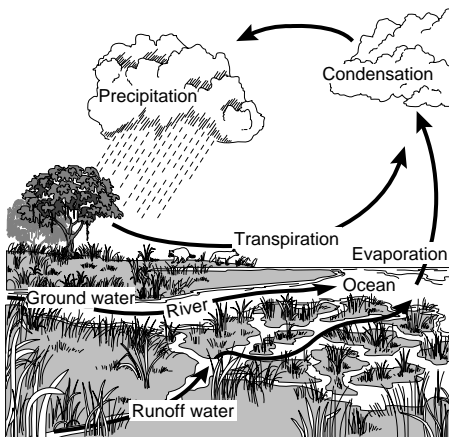
b) nutrient cycling with energy flow through ecosystems.

Builds On: Work with ecosystems begins with the third grade SOL and increases in complexity throughout the study of the science SOL.

A

47

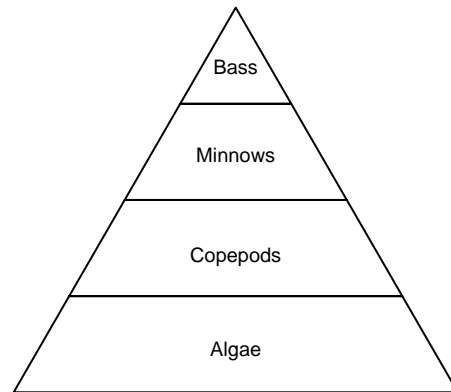
The Water Cycle



According to this simplified water cycle, the process of transpiration is the process that —

- A causes photosynthesis in plants
- B releases water vapor from plants
- C speeds the evaporation of water
- D increases the rate of the water cycle

48



Which level of this food pyramid represents the largest biomass?

- F Bass
- G Minnows
- H Copepods
- J Algae

Instruction: Provide students an opportunity to investigate and understand transpiration and the other processes that occur in the water cycle and the relationship of food pyramid levels to amounts of biomass.

Biology

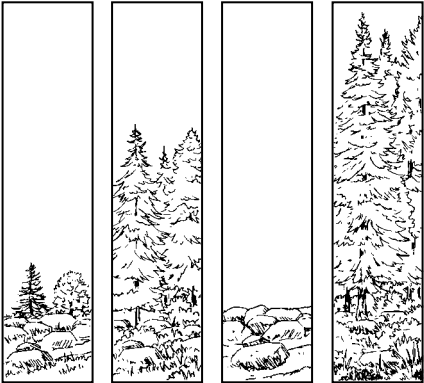
End of Course

A. Standard of Learning: BIO.9 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include

c) succession patterns in ecosystems.

Builds On: Work with ecosystems begins with the third grade SOL and increases in complexity throughout the study of the science SOL.

A 49



A B C D

Which order of diagrams would show primary succession in an area that had never before been occupied by living organisms?

A A, C, B, D
 B C, A, B, D
 C D, B, C, A
 D B, A, C, D

Instruction: Provide students an opportunity to understand how to identify diagrams of succession and to place them in order of occurrence.

Biology

End of Course

A. Standard of Learning: BIO.9 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include:

d) the effects of natural events and human influences on ecosystems.

Builds On: Work with ecosystems begins with the third grade SOL and increases in complexity throughout the study of the science SOL.

- A** 50 Wild cats such as cheetahs, lions, and tigers experience decreased genetic diversity as their populations decline and become fragmented due to habitat destruction. Decreased genetic diversity leads to populations with —
- F disproportionate gender ratios
 - G decreased disease resistance
 - H increased immigration rates
 - J increased birthrates

Instruction: Provide students an opportunity to investigate the effect of changing the genetic diversity on a population due to natural events or human influences.

Correct Answers

*End
of
Course*

BIOLOGY TEST

1. B 2. J 3. B 4. H 5. B 6. G 7. B 8. H 9. A 10. F
11. C 12. J 13. B 14. G 15. D 16. G 17. C 18. H 19. A 20. J
21. B 22. G 23. C 24. H 25. A 26. J 27. D 28. H 29. D
30. H 31. A 32. G 33. A 34. J 35. C 36. G 37. B 38. J
39. B 40. H 41. D 42. F 43. A 44. G 45. B 46. J 47. B
48. J 49. B 50. G